Metro Nashville Information Systems Architecture

INFORMATION TECHNOLOGY SERVICES

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1. Overview

1.1 The Need for Architecture Standards

All the departments in Metro Nashville government need to share information. They also need to share resources, such as internet access, electronic mail, antivirus protection, server storage, network cabling, and network services such as the provision and management of IP addresses, etc.

A private company that allowed every department to order implement and maintain incompatible information systems couldn't exist very long in a competitive environment. The shareholders of such a company would be understandably upset at such a practice, and would demand the ouster of the management team that let it happen. They would want to know how such a company could give up the:

- economies of scale,
- purchasing and support leverage,
- provision of a consistent interface to the customer,
- ease of communicating and sharing data,
- the lowered costs of maintaining and supporting one system rather than multiple ones

… all the advantages brought by a professional, centralized approach to information systems.

The sharing of information and the provision of information systems services needs to be both efficient and cost-effective. This is the guiding principle for establishing a common information systems architecture for Metro.

The Mayor of Metro Nashville needs to be able to send an electronic mail message to all Metro employees with the expectation that it will be delivered in a timely fashion. The taxpayers of Metro Nashville need to be spared from paying twice for information systems services, just because one department doesn't trust the other one, or for paying for the inefficient provision of information systems services, just because one department wants to maintain control.

If a department needs e-mail or file and print sharing services, and an existing server has the capacity to provide those, it is wasteful of the taxpayer's money to buy a new server just to satisfy that department's desire to have "their" hardware or software located at "their" department.

1.2 GartnerGroup Recommendations for Metro

The May, 2001, GartnerGroup Information Technology Strategic Plan for Metro highlighted the areas in need of architecture standards.

Gartner's study (http://www.nashville.org/intranet/infosystems/plan.htm) states:

> "Clear standards for Metro in these key areas will help ensure the consistent use of technology across the enterprise and the ability for Departments to share data and participate in shared services, especially the Web portal."

- Applications
    - o Desktop maintenance
    - o Desktop configurations/software sets
    - o Email usage
    - o Virus protection programs and implementation

- o Help desk systems
- o Internet filtering
- o Web content, look and feel
- o Imaging systems

- Data
  - o Data communications
  - o GIS mapping
  - o Enterprise data modeling
  - o Data collection (hardware and software standards)
  - o Business application standards
- Infrastructure
  - o
- Transaction Security
  - o Diagnostic tools
  - o Monitoring tools
  - o Digital authentication / digital signatures
  - o Intrusion detection systems
  - o Firewalls
  - o Encryption
  - o Secure e-mail
  - o Antivirus
- Internet Security
  - o Physical security
  - o Password security
  - o IP address security
- Privacy
  - o Data Privacy
  - o Transaction privacy

2. Metro's "Merged" Software and Hardware Standards

In cooperation with the 12 Metro project team members, GartnerGroup performed a comprehensive review of Metro's current hardware and software in the May, 2001, study. Gartner organized the information in a PowerPoint form referred to as "the bricks" because it divided the information into boxes based on current and planned future usefulness.

The project team (see Appendix A) and Gartner merged the different versions of the bricks into an "M" or "Metro" version that they agreed organized the existing hardware and software from all participating Metro departments (see Appendix B – Participating Departments Listing) into a common strategic direction, using current, two years away and five years away estimates. These "M Bricks" are summarized in the following list. Clarification for each category, not included in the study, is added in a first paragraph where useful.

2.1 Operating Systems and Hardware

WORKSTATION/CLIENT DESKTOP PC

This category includes basic and fully-featured desktop PCs, and advanced graphics workstations such as those used by engineers at Water Services or Public Works for Computer Aided Drawing (CAD). The focus here is on operating systems software; hardware standards are not addressed.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Windows 98		
Windows NT 4.0		
Windows 2000 Pro	Windows 2000 Pro	
Windows XP	Windows XP and its successors	Windows XP and its successors
Windows 95 (only needed for MTA's "Midas" software)		
Macintosh (specialized media platforms at Planning Department, Library and Government Access Channel)		

COMMENTS

      RECOMMENDED CHANGES TO ABOVE:

MOBILE/LAPTOP/WIRELESS/PDA

This is something of a catch-all category for computers smaller than a standard desktop. PDA stands for Personal Digital Assistant. These run the gamut from less-capable mobile e-mail devices like the BlackBerry, up through miniaturized PCs like the Palm and Compaq IPaq.

Hardware standards for these devices were not addressed by the Gartner study. The Police Department uses the most wireless network devices (laptop PC's in squad cars connected via CDPD or 800 MHz). The Fire Department has several Palm Pilots without wireless connections.

"MARKET WATCH" indicates pivotal developments in this area are expected shortly, making 5-year predictions untenable at this time.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Palm O/S	Palm O/S	Windows XP and its successors
Windows CE	Windows CE or successors	Windows CE or successors
	MARKET WATCH	MARKET WATCH

COMMENTS
Too much development in this area for accurate predictions at this time.

RECOMMENDED CHANGES TO ABOVE: *Due to rapid development in this area, hardware standards are not practical at this time..*

APPLICATION/DATA SERVER

An application server is any server that hosts applications. Such a server may also store the data. In what's known as a "3-tiered" environment, the data resides on a separate database server and is front-ended by a separate web server.

OS/400 is the operating system for the AS/400 minicomputers located at ISD and Compton (serving FastNet, EBS, Water, County Clerk and Health).

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Novell Netware 4.x, 5.x	Windows 2000 Advanced Server or successor	Windows 2003 or successor
Windows 2000 Advanced Server	Windows NT 4.0	DEC Unix (Water & Library)
Windows NT 3.51 & 4.0	LINUX	Sun Solaris (Network Mgt.)
DEC Unix	OS/400	OS/400
LINUX	Windows 2003	MARKET WATCH
OS/390	Sun Solaris (Network Mgt.)	
OS/400	DEC Unix (Water & Library)	
Sun Solaris (Network Mgt.)		

COMMENTS
Mainstream is Windows. Library using DEC Unix on INNOPAC turnkey system. Sheriff running UNIX cardkey system. Water uses UNIX turnkey system for monitoring remote pumping stations. Sun Solaris is required for enterprise-size network management.

RECOMMENDED CHANGES TO ABOVE:.

SPECIALIZED SERVER (DATA WAREHOUSE, DATABASE, WEB, APPLIANCE)

A database server provides database storage and access, potentially for multiple applications in separate databases. A data warehouse server stores specially filtered information in a query-optimized format. A web server stores and provides web pages.

Hardware requirements for these different specialized servers vary greatly:
- a database server needs fast disks and many of them,
- a data warehouse server has the needs of a database server plus processor speed and memory for handling multiple queries,
- a web server needs much less disk space and benefits from a large cache (memory) that minimizes disk access; this cache is often provided via a separate server or appliance called a "caching server".
- A server "appliance" is a server built from scratch to support one function, with an operating system and hardware capable only of that function (such as providing database services or file and print services); such servers can usually be easily re-built from the vendor CD and are accessible through a web interface or serial cable; they often do not include a keyboard or monitor.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Data Warehouse	**Data Warehouse**	**Data Warehouse**
None	MARKET WATCH	MARKET WATCH
Database Server	**Database Server**	**Database Server**
Windows 2000 / SQL 7.0 and 2000	Windows 2003 / SQL 2000 and successors	Windows 2003 and successors / SQL 2000 and successors
Windows NT / Oracle 8.x and 9.x	Oracle 9.x and successors	Oracle 9.x and successors
Unisys CP IX4400 MF		
Web Server	**Web Server**	**Web Server**
Linux Apache	Windows 2000 IIS	Windows 2000 IIS and successors
Windows 2000 / IIS		
Internet caching server or appliance	Internet caching server	Internet caching server
AS/400 (Finance - FastNet MRC)	AS/400 (Finance - FastNet MRC)	AS/400 (Finance - FastNet MRC)
AFIS (Police only)	**AFIS (Police only)**	**AFIS (Police only)**
NEC ACOS-4	NEC ACOS-4	MARKET WATCH
UNIX System V	UNIX System V	
EWS/UX & UX/4800 UNIX	EWS/UX & UX/4800 UNIX	
INNOPAC (Library only)	**INNOPAC (Library only)**	**INNOPAC (Library only)**
DEC UNIX	DEC UNIX	DEC UNIX
Library Automation system	Library Automation system	Library Automation system

COMMENTS
Assumes continued development of pre-installed servers that are optimized for one application and that are cheaper, easier to manage and faster than multi-function servers.

RECOMMENDED CHANGES TO ABOVE:

2.2 Middleware

BASIC – DATA, COMMUNICATIONS, PLATFORM

Middleware is software that enables application software to access data.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
CICS		SQL
SQL	SQL	OS/400 SQL
DB2	DB2 / UDB	FTP
IMS		MDAC
OS/400 SQL	OS/400 SQL	Custom programmed interfaces
FTP	FTP	Crystal Reports
MDAC [Microsoft Data Access Components]	MDAC	DB2 / UDB
Custom programmed interfaces	Custom programmed interfaces	
Crystal Reports	Crystal Reports	
Q-Term	Q-Term	

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

INTEGRATION – BUSINESS PROCESS, INTEGRATION BROKER, SUPER SERVICES, GATEWAYS

No software of this type was identified in the Gartner study.

RECOMMENDED CHANGES TO ABOVE: *None.*

2.3 Desktop Management

HARDWARE INVENTORY, SOFTWARE DISTRIBUTION, REMOTE CONTROL

Without software that enables these processes, hardware inventory and software distribution functions must be performed manually, at much higher man-hour costs. Remote control is basically considered a "help desk" function that enables remote troubleshooting of problems.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
NAI/Magic/LANdesk	NAI/Magic/LANdesk	MARKET WATCH
Shavlik / SUS (Microsoft Software Update Services patch management)	Shavlik / WUS (Microsoft Windows Update Services - patch management)	Successors to WUS
Novell Zenworks (JIS, Police)		
Microsoft SMS [Systems Management Server]	Microsoft SMS [Systems Management Server]	

COMMENTS
Novell Zenworks contained to use only within JIS and Sheriff. MS SMS probably expanding to schools.

RECOMMENDED CHANGES TO ABOVE:

2.4 Application Development

MONOLITHIC (MAINFRAME)

During the Gartner study the decision was made to limit further mainframe development. ISD is currently implementing alternative hardware and software platforms.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
COBOL	None – both Police and ITS mainframes in active plans for replacement	None – both Police and ITS mainframes in active plans for replacement
CICS		
IMS		
DB2		
USC COBOL (Police)		
C++ (Police)		
UNISYS MAPPER (Police)		

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

N-TIER DESKTOP APPLICATION DEVELOPMENT ENVIRONMENT – USER INTERFACE AND USER INTERFACE GENERATOR

This defines the toolset for developing client software on the PC that "front-ends" network-based software.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Visual Basic - SQL	Visual Basic – SQL	MARKET WATCH
PowerBuilder (JIS & Sheriff only)	PowerBuilder successor (JIS & Sheriff only)	PowerBuilder successor (JIS & Sheriff only)
MS Access (Parks and Library)	MS Access	

COMMENTS
Will attempt to contain development of department-wide Access applications (such as at the Library and Parks) that are difficult to maintain and support.

RECOMMENDED CHANGES TO ABOVE: *Carry "Visual Basic – SQL or successors" over to five-year Strategic Direction. Examine two-year need for MS Access (Library?).*

APPLICATION DEVELOPMENT ENVIRONMENT

This defines the toolset for developing network-based software that "back-ends" the client software on the PC.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Visual Basic - SQL	MS Visual Studio	MARKET WATCH
		successor to MS Visual Studio
	PowerBuilder successor (JIS & Sheriff only)	PowerBuilder successor (JIS & Sheriff only)
PL/SQL (Sheriff only)	PL/SQL (Sheriff only)	PL/SQL (Sheriff only)

COMMENTS
PowerBuilder is a strategic product to JIS and Sheriff only. It is contained for all other users.

RECOMMENDED CHANGES TO ABOVE:

CASE (COMPUTER-AIDED SOFTWARE ENGINEERING)

CASE software provides an environment that standardizes the design and development of program code..

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
System Architect - JIS	System Architect - JIS	MARKET WATCH

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

INTERNET/INTRANET/EXTRANET – HTML CREATION TOOLS, WEB DEVELOPMENT TOOLS

This defines the toolset for developing web-based applications.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
HTML	Visual Studio .NET	MARKET WATCH
Visual Basic	XML	
Perl	ADO.NET	Visual Studio .NET
Allaire Homesite	C#?	ASP+
Java (Finance – FastNet)	ASP+	HTML
	Oracle Web tools	Perl
	HTML	Javascript
	Perl	XML
	Javascript	Java (Finance – FastNet)
	Java (Finance – FastNet)	

COMMENTS
Direction should come in part from Link2Gov.

RECOMMENDED CHANGES TO ABOVE: *None.*

APPLICATION DEVELOPMENT ENVIRONMENT METHODOLOGIES

This is a standard set of procedures, forms and policies that govern application development.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
None	Object-oriented	MARKET WATCH
	Reusable modules	

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

2.5 Database

ENTERPRISE, BUSINESS UNIT, MOBILE APPLICATION DBMS (DATABASE MANAGEMENT SYSTEMS)

During the Gartner study the decision was made to limit further mainframe development. ISD is currently implmenting alternative hardware and software platforms.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Enterprise	**Enterprise**	**Enterprise**
IMS	IMS	SQL 2000 successor
DB2	DB2/UDB	Oracle
VSAM	VSAM	INNOPAC Proprietary (Library only)
Oracle 8.x	Oracle 9.x	MARKET WATCH
RDMS EXEC	RDMS EXEC	
RDMS TIP	RDMS TIP	
SFS	SFS	
MAPPER	MAPPER	
SQL 2000	SQL 2000	
INNOPAC Proprietary (Library only)	INNOPAC Proprietary (Library only)	
Business Unit	**Business Unit**	**Business Unit**
SQL 2000	successors to SQL 2000	SQL 2000 successor
Sybase		Oracle
DB2	Oracle	MARKET WATCH
Oracle	Foxpro	
Foxpro	Access	
Mobile	**Mobile**	**Mobile**
SQL	SQL	MARKET WATCH
Oracle 8.x	Oracle	
	Access	

COMMENTS
MS Access and UDB is contained to use by Planning Commission. RDMS, SFS and Mapper used by

Police only.

RECOMMENDED CHANGES TO ABOVE:.

MANAGEMENT, DESIGN AND UTILITIES

This defines the toolset for managing databases (expanding the log and database container sizes, compressing or deleting inactive/unnecessary record space, re-initializing index files, etc.), for designing databases (setting the initial memory and disk space usage, estimating the field and record sizes, etc.) and related utilities (monitoring for database disk or container usage, testing for file corruption, etc.).

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Oracle toolset	Oracle toolset	MARKET WATCH
SQL toolset	SQL toolset	
Integrated Recovery Utility (Police only)	Integrated Recovery Utility (Police only)	
UNISYS Repository Manager (Police only)	UNISYS Repository Manager (Police only)	
Oracle Enterprise Management (Sheriff only)	Oracle Enterprise Management (Sheriff only)	
Oracle Diagnostic Pack (Sheriff only)	Oracle Diagnostic Pack (Sheriff only)	

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

DATA WAREHOUSE DBMS

A data warehouse is a repository of filtered information stored in a query-optimized format. Though the Gartner study found potential and interest for data warehousing within Metro, it was tempered by the recognized complexity and cost of setting up and managing a data warehouse. The Project Team and Gartner agreed any such efforts should be initially small, manageable and focused on maximum payback.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
None	OLAP	MARKET WATCH
	SQL	
	DB2/UDB (Planning only)	
	Oracle	

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

DECISION SUPPORT TOOLS

Decision support software organizes large and complex data into the optimal format for supporting data-based decisions.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
ESRI Family Products	ESRI Family Products	MARKET WATCH
SoftTrack (Library)	SoftTrack (Library)	ESRI Family Products
INNOPAC Tools (Library)	INNOPAC Tools (Library)	INNOPAC Tools (Library)

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

2.6 Network Services

ENTERPRISE NETWORK OPERATING SYSTEM (NOS)

This sets the standard(s) for operating systems used by enterprise network servers.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Windows 2000 Advanced Server	Windows 2003 Server	Windows 2003 Server and successors
Digital Unix (Library only)	Digital Unix	
Linux	Linux	Sun/Solaris
Sun/Solaris	Sun/Solaris	
Netware 5.x		

COMMENTS
Sun/Solaris almost certain to continue to provide the OS for our network management platforms.

RECOMMENDED CHANGES TO ABOVE:

DIRECTORY SERVICES AND NAMING CONVENTIONS

Directory services is the "phone book" function of a network operation system. It allows users to more easily find and share resources across the enterprise. The Information System Department's (ISD) current rollout of Microsoft Windows Active Directory services to other Metro departments is about 30% complete.

Naming conventions make it easier for users to distinguish the location, ownership and/or function of resources. ISD currently uses Greek god names for servers.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)

Windows 2000 Active Directory	Windows 2000 Active Directory	Windows 2000 Active Directory
NT Domain		
Novell bindery/NDS		

COMMENTS
Only a few Novell bindery/NDS servers and NT Domains remain.

RECOMMENDED CHANGES TO ABOVE: *None.*

LOCAL AREA NETWORK (LAN) COMMUNICATION PROTOCOLS

These standards define the basic communications "languages" used by local area network servers. The IEEE organization defines engineering standards for these protocols.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Ethernet	Ethernet	Ethernet
IP	IP	IP
IPX	DLC	
NetBIOS		
DLC		

COMMENTS
Expectation is that Ethernet will continue to dominate development and feature set of LAN connectivity.

RECOMMENDED CHANGES TO ABOVE:

LAN WIRING

This defines the standard cable type to be used in connecting the network. It's worth noting that current network cabling in Metro is uneven and problematic: there is a significant amount of lower-grade (not certified for current LAN speeds) cable installed that needs replacing, proper fire-rated cable is not always used where it should be, and much wiring is not properly labeled or bundled ("spaghetti" installs).

Network consultant Federal Engineering has helped create a cabling specifications document that provides standards for new construction and remodeling of Metro buildings.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Category 5	Category 6	Category 6 or successor
Token Ring	Multimode fiber	Multimode fiber
Thin Coax	Single mode fiber	Single mode fiber
Multimode fiber		
Single mode fiber		MARKET WATCH

COMMENTS
Doubt that copper wiring will be replaced anytime soon as a general local LAN standard. Wireless technology is expected to proliferate.

RECOMMENDED CHANGES TO ABOVE:

LAN TOPOLOGY

This defines the general physical layout of the Local Area Network (LAN).

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
10 Mb Ethernet Non-switched.	100 Mb Ethernet Switched to all servers and preferred to desktops	Switched to all servers and desktops
10 Mb Ethernet Switched	Gb and 10 Gb Ethernet	Gb and 10 Gb Ethernet
100 Mb Ethernet Switched		Voice, video and data over common line/protocol

COMMENTS
Move to standard LAN/WAN connections via CAP fibers. Migrate onto the same wiring platform for voice and data in the office.

RECOMMENDED CHANGES TO ABOVE:.

WIDE AREA NETWORK (WAN) PROTOCOLS

This defines the communications protocols used between Metro sites. Strictly speaking, Metro's network is a Metropolitan Area Network (MAN) rather than a WAN.
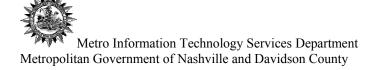
CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
SONET / MSPP	SONET / MSPP	SONET / MSPP
ISDN	ISDN	
T-1	T-1	T-1
PPP Dial-up	PPP Dial-up	PPP Dial-up
Frame Relay	Frame Relay	Frame Relay
NMLI (Water Service)	NMLI (Water Service)	10-Gigabit Ethernet and successors
SNA	Gigabit or 10-GB Ethernet	
VPN	VPN	VPN
		MARKET WATCH

COMMENTS
NMLI is "Native Mode LAN Interface", BellSouth's proprietary conditioned line service.

RECOMMENDED CHANGES TO ABOVE:.

VOICE

This defines how voice communications services will be implemented. Metro is expecting guidance by December of this year from the current Federal Engineering Telecommunications study regarding the advisability of implementing shared voice/data lines, video/voice teleconferencing, and voice-over-IP or voice-over-ATM technology.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
PBX	PBX	PBX
VoIP	VoIP	VoIP
T-1	T-1	T-1
ISDN	ISDN	
Branch Communications Managers	Branch Communications Managers	Branch Communications Managers
P-Sets	ACD – Call Centers	ACD – Call Centers
		Voice, video and data straight to the desktop with managed, centralized messaging
Analog POTS	Analog POTS	Analog POTS
Centrex Service	Centrex Service	
Key Digital Systems	Key Digital Systems	
1A-Key		MARKET WATCH

COMMENTS
Centrex and Key Digital systems are being contained and phased out. Analog POTS (Plain Old Telephone Service – non-digital lines) is contained. Some POTS lines always kept as backups.

    RECOMMENDED CHANGES TO ABOVE:.

WIRELESS – LAN, MAN, WAN

This defines how wireless communications technology is expected to affect LAN, MAN and WAN standards.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
802.11a (point-to-point)	Successor to 802.11a	Successor to 802.11a
802.11x (inside building)	802.11x (inside building)	802.11x (inside building)
800 MHz (RDLAP)	800 MHz	800 MHz
	900 MHz	900 MHz
	Mobile mesh network coverage	Mobile mesh network coverage
MARKET WATCH	MARKET WATCH	MARKET WATCH

COMMENTS
Expect that wireless use will explode for both point-to-point and mobile connectivity. This area is experiencing such rapid technical development that Market Watch is valid for all three columns. 802.11a now connecting over 30 Fire halls and several police sites. Courthouse was using mobile wireless connections on one floor (JIS). SCADA system for monitoring remote pumping station operations is contained to Water Services. 2Mb wireless used by Social Services proved unsatisfactory.

    RECOMMENDED CHANGES TO ABOVE: *None.*

TERMINAL EMULATORS / GATEWAYS

Metro is moving away from "thick client" terminal emulators that require installs and updates of workstation software. Browser-based emulation is preferred because it removes the need for such client installs and updates and requires only browser software to be available on the client workstation.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
PC Software – 3270 SAA	Browser-based 5250 & 3270	Browser-based 5250 / 3270
PC Software – 5250 AS/400	PC Software 5250	PC Software 5250
PC Hardware – 3270	Uniscope Emulation Software	Windows 2000 Terminal Server and successor
IBM 3720 Hardware, Terminals	Windows 2000 Terminal Server and successor	INNOPAC dial-in
Uniscope Emulation Software	Netware SAA Gateway	
Windows 2000 Terminal Server	Browser-based INNOPAC access	
Netware SAA Gateway	Anzio Terminal Emulation to DEC	
INNOPAC dial-in	Windows 2000 Terminal Server	
Anzio Terminal Emulation to DEC	Browser-based INNOPAC access	
	INNOPAC dial-in	

COMMENTS
Creation of IP-only network.

RECOMMENDED CHANGES TO ABOVE:.

IP ADMINISTRATION

This defines how IP addresses are assigned, distributed, recorded and managed.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
DHCP	DHCP	DHCP
DNS	DNS	DNS
WINS	WINS	MARKET WATCH

COMMENTS

RECOMMENDED CHANGES TO ABOVE:

NETWORK SYSTEMS MANAGEMENT

HP OpenView is seen as the overall "manager of managers" that other management software will send alerts to. SNMP (Simple Network Management Protocol) is seen as the basic means of transferring alert information.

HPOpenview for Windows is seen as the application monitoring that can provide proactive notification of problems with key network applications such as Exchange, SQL and other department-specific applications.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
HP Openview	HP Openview	HP Openview or successor
Solar Winds	Solar Winds	Solar Winds or successor
Cisco Works	Cisco Works	Cisco Works or successor
Cisco TACACS	Cisco TACACS	Cisco TACACS or successor
HP TopTools (JIS)		MARKET WATCH
What's Up Gold		
MRTG (Multi Router Traffic Grabber – free statistical reporting HTML tool)		

COMMENTS
Convergence of voice and data will require SLAs and trending applications. Solar Winds and other systems management tools communicate back through SNMP traps to HP Openview as the "manager of managers". Future approach will be tiered and include alerting, element management and baseline/trending capabilities, preferably with a browser interface and web-based reporting. MRTG may continue to have a place as a "point solution".

RECOMMENDED CHANGES TO ABOVE:.

OTHER SERVICES – USER ADMINISTRATION, PROBLEM/CHANGE MANAGEMENT, CONFIGURATION MANAGEMENT, ENTERPRISE SERVICE DESK AND HELP DESK

Customer Relationship Management (CRM) software from Interactive Intelligence and Pivotal is being investigated as an enterprise solution for government 3-1-1 services. This software provides a wide range of computer-telephony integration, unified messaging and automated intelligence features.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
NAI/Magic/LANdesk	NAI/Magic/LANdesk	NAI/Magic/LANdesk or successor
Windows 2000 Terminal Services		
SUS	WUS	WUS or successors
Shavlik	Shavlik	
SMS (Schools only)	MARKET WATCH	MARKET WATCH

COMMENTS
May move to SMS, depending upon the experience the schools have with their current planned testing.

RECOMMENDED CHANGES TO ABOVE: *None.*

2.7 Security

AUTHORIZATION

The administration and maintenance of multiple computer system accounts within Metro is a known problem. ISD intends for Windows 2000 Active Directory to become the central authorization point for LAN-based resources, and has encouraged vendors to provide "pass-through" authentication that uses Active Directory, rather than requiring separate application accounts to be set up and administered.

PKI or Public/Private Key Infrastructure is expected to become an important authorization solution over the coming years. It uses "certificates" validated by a common public source to identify trusted users for access or financial transactions. The Kerberos "hooks" for PKI are built into Windows Active Directory.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Windows 2000 Active Directory "pass-through"	Windows 2000 Active Directory "pass-through"	Windows 2000 Active Directory "pass-through"
Password-based	Password-based	
Application Logic	Application Logic	
VPN	VPN	VPN
Cisco TACACS	Cisco TACACS	Cisco TACACS or successor
RACF (ISD mainframe)		
NT Domains		
Novell NDS and Bindery	Hardware Key or biometrics	Hardware Key or biometrics
PKI	PKI	
Radius		
		MARKET WATCH
INNOPAC – password-based, application-specific (Library)	INNOPAC – password-based, application-specific (Library)	INNOPAC – password-based, application-specific (Library)
IP-based security through INNOPAC (Library)	IP-based security through INNOPAC (Library)	IP-based security through INNOPAC (Library)

COMMENTS
"Pass-through" identification, wherein the application is Windows 2000 Active Directory aware, and does not need its own security accounts listing to be maintained separately. INNOPAC contained to Library use only.

RECOMMENDED CHANGES TO ABOVE:

NETWORK FIREWALLS, INTERNET FIREWALLS

A firewall is any hardware or software device that serves to filter access to a private network. Such filtering is usually based on low-level network layer information, such as IP address, IP socket or machine address code (MAC). Metro has two major firewalls, one located at ISD, the other at the Police data center.

ISD is adding redundancy to its current firewall and replacing the Timestep VPN with a more flexible and more easily installed solution from FlatEarth Security. The existing NT/Checkpoint-1 firewall will be replaced by dual redundant Nokia firewall appliance systems that run Checkpoint-1 software.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Nokia/Checkpoint	Nokia/Checkpoint	Nokia/Checkpoint
Router Filters	Router Filters	Router Filters
Cisco PIX firewall	Cisco PIX firewall	Cisco PIX firewall
Cisco VPN concentrator	Cisco VPN concentrator	Cisco VPN concentrator

	Security appliances (IDS, IPS)	Security appliances (IDS, IPS)
		MARKET WATCH

COMMENTS
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RECOMMENDED CHANGES TO ABOVE:

PHYSICAL – DISTRIBUTED, DATA CENTER

This addresses the physical measures taken to protect information systems resources.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Cardkey	Cardkey	Smartcard / RFID / biometrics or other, integrating physical access with data access
Keyed locks	Keyed locks	
CCTV	CCTV	CCTV
		MARKET WATCH

COMMENTS
Security CCTV (Closed Circuit TV) / Streaming video can easily be handled by our OC-48 SONET backbone, but may be problematic for remote sites connecting via T-1, ISDN or wireless.

RECOMMENDED CHANGES TO ABOVE:.

OTHER SERVICES – VIRUS PROTECTION, REMOTE ACCESS

The business disruptions caused by virus infections over the last few years, particularly those transmitted via e-mail, have made virus protection a major concern for Metro. A virus is any program that spreads without the intent of the user. Most viruses have a "payload": a malicious action triggered by time or other action.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Virus Protection	**Virus Protection**	**Virus Protection**
NAI (McAfee) Antivirus for servers and desktops	First-tier Metro-wide standardized antivirus for servers and desktops	First-tier Metro-wide standardized antivirus for servers and desktops
NAI (McAfee)Antivirus for Exchange (e-mail) across Metro	First-tier Metro-wide standardized antivirus for Exchange (e-mail) across Metro	First-tier Metro-wide standardized antivirus for Exchange (e-mail) across Metro
Symantec antivirus for Exchange and servers/desktops (Police, Sheriff and JIS)		
	SMTP gateway antivirus protection for incoming third-party web-based email accounts and VPN access	SMTP gateway antivirus protection for incoming third-party web-based email accounts and VPN access
Post-problem detection/removal	Front-end detection/removal of	Front-end detection/removal of

of internet spyware/adware via Spybot and AdAware	internet spyware/adware	internet spyware/adware
Spam filtering	Spam filtering	Spam filtering
Remote Access	**Remote Access**	**Remote Access**
VPN	VPN	VPN
Dialin	Dialin	Dialin
Radius	Caller ID	Caller ID
Caller ID		
Windows 2000 RAS		
INNOPAC Dial-in (Library)		
		MARKET WATCH

COMMENTS
INNOPAC dial-in contained to Library use only.

RECOMMENDED CHANGES TO ABOVE:.

2.8 E-Mail / Messaging

E-MAIL BACKBONE

This defines the system(s) responsible for managing, storing and delivering e-mail across the enterprise.

E-mail has become a mission-critical application for Metro. ISD is moving to centralize e-mail provision to facilitate standard procedures and enterprise-class services.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Exchange 5.5	Exchange 2003	Exchange 2003 or successor
Exchange 2000		
INNOPAC integrated e-mail system (Library)		

COMMENTS
INNOPAC e-mail contained to Library use only.

RECOMMENDED CHANGES TO ABOVE:.

E-MAIL USER SOFTWARE

This defines the client software used to connect to e-mail.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Outlook	Outlook	Outlook
Outlook Web Access	Outlook Web Access	Outlook Web Access
Outlook 8.2 for Macintosh	Outlook 8.2 for Macintosh	

(Library)	(Library)	
INNOPAC integrated e-mail (Library)		
Blackberry devices / BES server	Blackberry devices / BES server	Blackberry devices / BES server

COMMENTS: INNOPAC clients contained to Library use only.

RECOMMENDED CHANGES TO ABOVE:.

E-MAIL ELECTRONIC DATA INTERCHANGE (EDI)

This defines the standard for using EDI with E-mail. No current usage or plans for this area were identified by the Gartner study.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
None	None	None

COMMENTS: Continuing need to transmit internet e-mail in an encrypted/secure manner,
particularly when transmitting financial information. Use of an expiration date via U.S. Postal service e-mail services is being used intermittently currently by Finance. An RFP is also in the works.

RECOMMENDED CHANGES TO ABOVE: *None.*

CALENDARING / SCHEDULING

This defines the standard for managing the calendaring or scheduling of individual and meeting room appointments.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Outlook	Outlook	Outlook
Outlook Web Access	Outlook Web Access	Outlook Web Access
		MARKET WATCH

COMMENTS

RECOMMENDED CHANGES TO ABOVE: *None.*

2.9 Personal Productivity

OFFICE APPLICATIONS AND WEB BROWSER

This sets the standard for personal productivity software that enables the basic business functions of computing: word processing, spreadsheets, e-mail, presentations, personal databases, project management, organizational and other charting, faxing, mapping, graphing, etc.

Office XP was not announced at the time of the Gartner study, nor was Microsoft's new pricing model which no longer gives upgrade credits and pushes customers toward a subscription model.

Somehow, the study failed to note Metro's standard usage of Microsoft Internet Explorer as a web browser or the Library's use of the Internet Navigator browser.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
MS Office Suite v97 & 2000 • Word • Excel • Powerpoint • Access • Outlook	MS Office 2003 Suite: • Word • Excel • Powerpoint • Access • Outlook	MS Office 2003 Suite or successor: • Word • Excel • Powerpoint • Access • Outlook
MS Visio	MS Visio	MS Visio
MS Project	MS Project	MS Project
Adobe Acrobat Reader	Adobe Acrobat Reader	Adobe Acrobat Reader
Adobe Illustrator	Adobe Illustrator	Adobe Illustrator
Adobe PageMaker	Adobe PageMaker	Adobe PageMaker
Adobe Photoshop	Adobe Photoshop	Adobe Photoshop
ESRI mapping products [Arcview]	ESRI mapping products [Arcview]	ESRI mapping products [Arcview]
OmniPage Pro (Police)	OmniPage Pro (Police)	OmniPage Pro (Police)
PCDocs	PCDocs	
RightFax (JIS)	RightFax (JIS)	MARKET WATCH
WordPerfect	Anzio (Library)	
Lotus 1-2-3 (MTA)	FileMaker (Library)	
LizardTech		
Avenza MapPublisher		
Extensis Portfolio		
Transcad		
Anzio (Library)		
FileMaker (Library)		

COMMENTS

        RECOMMENDED CHANGES TO ABOVE: *None.*

2.10 External Services

PROVIDER SERVICES – E-MAIL MESSAGING, INTERNET SERVICES

This lists the external services we currently use and plan to use for providing offsite e-mail services and/or internet access.

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CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
15 Mb Ethernet Internet feed [from Telcove Communications]	Fractional T-3	MARKET WATCH

COMMENTS
Move to multiple internet providers planned to provide redundant fail-safe connection.

> **RECOMMENDED CHANGES TO ABOVE:** *None.*

VALUE ADDED NETWORK SERVICES

This lists the value added network services we currently use and plan to use for providing offsite e-mail services and/or internet access. Such services are also referred to as "turnkey" systems, where everything is installed, configured and maintained so that the customer has only to "turn the key" to use it.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Innovative Interfaces, Inc.turnkey INNOPAC library automation system including WAN support (Library)	Innovative Interfaces, Inc.turnkey INNOPAC library automation system including WAN support (Library)	Innovative Interfaces, Inc.turnkey INNOPAC library automation system including WAN support (Library)
NEC AFIS fingerprint identification system (Police)	NEC AFIS fingerprint identification system (Police)	NEC AFIS fingerprint identification system (Police)
		MARKET WATCH

COMMENTS
INNOPAC contained to Library use only.

> **RECOMMENDED CHANGES TO ABOVE:** *Review Metro environment for turnkey applications that may have been missed by the survey.*

2.11 Imaging

IMAGING

The use of imaging is already well under way in Metro to
- reduce the costs of managing and storing paper records,
- increase the retrieval speed and likelihood of finding stored records,
- increase the survivability of historical records,
- provide workflow functionality,
- increase the functionality of stored records by providing electronic notations, multiple overlays, allowing cut-and-paste into electronic documents, internet access and e-mail, etc.

A "community of interest" group for imaging has been formed within Metro since the completion of the Gartner study, and has met several times. Metro plans to provide better workflow capability and links to the AS/400 FastNet system.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
Decision Management Company (DMC)	Decision Management Company (DMC)	Evidence Processor – crime scene digital photos (Police)
Accu-Image (Documentum and Legato)	Accu-Image (Documentum and Legato)	Accu-Image (Documentum and Legato)

INNOPAC Integrated Imaging into Library Automation System (Library)	INNOPAC Integrated Imaging into Library Automation System (Library)	INNOPAC Integrated Imaging into Library Automation System (Library)
Evidence Processor – crime scene digital photos (Police)	Evidence Processor – crime scene digital photos (Police)	
		MARKET WATCH
GIS	**GIS**	**GIS**
ArcView/ArcInfo	ArcView/ArcInfo	ArcView/ArcInfo
MapInfo (Sheriff)	MapInfo (Sheriff)	

COMMENTS
Expectation is for imaging and GIS to become increasingly pervasive and critical.

RECOMMENDED CHANGES TO ABOVE:.

2.12 Maintenance

MAINTENANCE

Maintenance service standards ensure known repair procedures and expectations for critical systems.

CURRENT (BASELINE)	2 YEARS (TACTICAL DEPLOYMENT)	5 YEARS (STRATEGIC DIRECTION)
7 X 24 maintenance agreements on all critical systems (servers, network gear)	7 X 24 maintenance agreements on all critical systems (servers, network gear)	7 X 24 maintenance agreements on all critical systems (servers, network gear)
General 4-hour response time required as minimum, less on more critical equipment	General 4-hour response time required as minimum, less on more critical equipment	General 4-hour response time required as minimum, less on more critical equipment
On-site spares on critical systems parts that fail most often (common network gear, server drives)	On-site spares on critical systems parts that fail most often (common network gear, server drives)	On-site spares on critical systems parts that fail most often (common network gear, server drives)
Time and materials on non-critical gear such as PC printers	Time and materials on non-critical gear such as PC printers	Time and materials on non-critical gear such as PC printers

COMMENTS
Costs for 4-hour and less response times must be limited to mission-critical equipment and applications where spares and internal staff will not suffice. 7X24 is mainstream direction.

RECOMMENDED CHANGES TO ABOVE: *None.*

3. ITS Purchasing Guidelines for PCs, Laptops and Servers

Recommended miminum hardware configurations for the purchase of PCs, laptops and servers.

3.1 Server Hardware Specifications

Minimum Space Rack Configuration (minimum specs or better)
Pentium II Xeon (2) 700MHz Processor with 256K Cache
256MB RAM minimum expandable to 2GB RAM
Three (3) 18GB SCSI Hard Drives (10,000 RPM) RAID 5
Mirrored Drive for OS (9GB or better)
1.44MB Floppy
24X or better CD-ROM Drive
10/100 NIC card (3COM or Server Manufacturer)
RAID Array Controller
Monitor/Keyboard/Mouse
DDS4 Tape Backup (external with Cable)
Redundant Fans and Power Supplies
Windows 2000 Advanced Server OS
Three Year on Site Support and Warranty with 24/7, 4 hour response

RECOMMENDED CHANGES TO ABOVE: *None.*

Small Server Configuration (minimum specs or better)
Pentium II Xeon 700MHz Processor with 256K Cache (Expandable to 2 processors) (Small Tower Configuration)
256MB RAM minimum expandable to 2GB RAM
Three (3) 18GB SCSI Hard Drives (10,000 RPM) RAID 5
Mirrored Drive for OS (9GB or better)
1.44MB Floppy
24X or better CD-ROM Drive
10/100 NIC card (3COM or Server Manufacturer)
RAID Array Controller
Monitor/Keyboard/Mouse
DDS4 Tape Backup (external with Cable)
Redundant Fans and Power Supplies
Windows 2000 Advanced Server OS
Three Year on Site Support and Warranty with 24/7, 4 hour response

RECOMMENDED CHANGES TO ABOVE: *Add DLT 40/80 tape as an option.*

Medium Server Configuration (minimum specs or better)
Pentium II Xeon 700MHz Processor with 256K Cache

(Expandable to 4 processors) (Tower or Rack Configuration)
512MB RAM minimum expandable to 2GB RAM
Three (3) 18GB SCSI Hard Drives (10,000 RPM) RAID 5
Mirrored Drive for OS (9GB or better)
1.44MB Floppy
24X or better CD-ROM Drive
10/100 NIC card (3COM or Server Manufacturer)
RAID Array Controller
Monitor/Keyboard/Mouse
DDS4 Tape Backup (external with Cable)
Redundant Fans and Power Supplies
Windows 2000 Advanced Server OS
Three Year on Site Support and Warranty with 24/7, 4 hour response

RECOMMENDED CHANGES TO ABOVE: *Add DLT 40/80 tape as an option.*

Large Server Configuration (minimum specs or better)
Four (4) Pentium II Xeon 700MHz Processors with 256K Cache (Expandable to 8 processors) (Rack Configuration)
512MB RAM minimum expandable to 4GB RAM
Three (3) 18GB SCSI Hard Drives (10,000 RPM) RAID 5
Mirrored Drive for OS (9GB or better)
1.44MB Floppy
24X or better CD-ROM Drive
10/100 NIC card (3COM or Server Manufacturer)
RAID Array Controller
Monitor/Keyboard/Mouse
DDS4 Tape Backup (external with Cable)
Redundant Fans and Power Supplies
Windows 2000 Advanced Server OS
Three Year on Site Support and Warranty with 24/7, 4 hour response

RECOMMENDED CHANGES TO ABOVE: *Add DLT 40/80 tape as an option. Minimal memory should probably be 1Gb.*

2.2 Base Laptop PC Hardware Specifications

ITEM *(or better)* ISD460 Dell Quote #57822911 $2,395.00, January 5, 2001
850MHz (or better) PIII Laptop with 15.0 TFT LCD Screen
128MB Memory (one DIMM)
16MB VRAM
10GB (or better) EIDE Hard Drive
10/100 NIC/Modem Integrated Combo Card
3.5" High Density (1.44MB) Diskette Drive
32x (or better) CD-ROM Drive
Windows 2000 (installed)

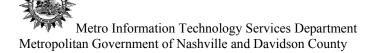|	
Nylon Carrying Case	
Three Year Next Business Day Complete Care Parts and Labor Warranty	

PRICE UPGRADES

75.00	128 MB Upgrade (total of 256MB)
275.00	256 MB Upgrade (total of 384MB)
350.00	384 MB Upgrade (total of 512MB)
75.00	20 GB Hard Drive
85.00	850 MHz Processor (Lat C600)
185.00	1GHz Processor (Lat C800)
150.00	32MB Total Video Ram (Lat C800)
212.00	Advanced Port Replicator
425.00	Docking Station (Includes module bay, pci slots & SCSI port)
121.00	Spare Battery
25.00	Grey 104-Key QuietKey/Spacesaver Keyboard
25.00	Grey Microsoft Intellimouse
200.00	Grey M781P 17" Monitor
405.00	Grey P991 19" Monitor
760.00	Grey P1110 21" Monitor

2.2 Base PC Hardware Specifications

ITEM *(or better)* ISD468 Dell Quote #60993916 $1,050.00 Updated June 14, 2001
933MHz (or better) PIII Mini-Tower Workstation with 256-KB Write-Thru Cache (or better)
128MB Memory (one DIMM)
4MB Video Card
17" SVGA Multi-Scanning, Non-Glare, Non-Interfaced Monitor with .28mm Pitch (or better)
Minimum of two (2) Serial Ports, one (1) high speed EPP Parallel Port, one (1) PS2 Mouse Port, and one (1) Keyboard Port
10GB (or better) EIDE Hard Drive
3COM Ethernet PCI 10/100 3C905-TX Network Interface Card (or equivalent)
Sound Card and Stereo Speakers
3.5" High Density (1.44MB) Diskette Drive
104-Key QuietKey/Spacesaver Keyboard
IntelliPoint Wheel Mouse, latest Version with Mouse Pad
32x (or better) CD-ROM Drive
One (1) USB Port (or better)
Windows 2000 (installed)
Three Year Parts and Labor Warranty 24x7 (On-Site Service)

BASIC MACHINE PRICE UPGRADES

$85	Upgrade to 1GB MHZ chip
$90	Upgrade RAM to 256MB (maximum of two DIMM's)

$150	Upgrade RAM to 384MB
$235	Upgrade RAM to 512MB from 256MB
$ 60	Upgrade VRAM from 4MB to 16MB (NVIDIA TNT2)
$195	Upgrade VRAM from 16MB to 32MB (Matrox Dual Monitor Capable)
$205	Upgrade monitor from 17" SVGA to 19" SVGA (.28mm pitch or better)
$560	Upgrade monitor from 19" SVGA to 21" SVGA (.28mm pitch or better)
$ 70	Upgrade CD-ROM to 16XDVD-ROM Drive
$135	Add 4/8/32x (or better) CD-RW Drive (in addition to existing CD-ROM drive)
	Substitute Stereo Headphones for Speakers
$30	Upgrade Hard Drive to 20GB
$70	Upgrade Hard Drive to 40GB
$375	Substitute 17" monitor with 15" LCD TFT Flat Panel Monitor
$690	Substitute 17" monitor with 17" LCD TFT Flat Panel Monitor
$135	Add 250MB Zip Drive
$55	56K Fax/Modem

3.2 PC Hardware Specifications

ITEM *(or better)* ISD468 Dell Quote #60993916 $1,050.00 Updated June 14, 2001
933MHz (or better) PIII Mini-Tower Workstation with 256-KB Write-Thru Cache (or better)
128MB Memory (one DIMM)
4MB Video Card
17" SVGA Multi-Scanning, Non-Glare, Non-Interfaced Monitor with .28mm Pitch (or better)
Minimum of two (2) Serial Ports, one (1) high speed EPP Parallel Port, one (1) PS2 Mouse Port, and one (1) Keyboard Port
10GB (or better) EIDE Hard Drive
3COM Ethernet PCI 10/100 3C905-TX Network Interface Card (or equivalent)
Sound Card and Stereo Speakers
3.5" High Density (1.44MB) Diskette Drive
104-Key QuietKey/Spacesaver Keyboard
IntelliPoint Wheel Mouse, latest Version with Mouse Pad
32x (or better) CD-ROM Drive
One (1) USB Port (or better)
Windows 2000 (installed)
Three Year Parts and Labor Warranty 24x7 (On-Site Service)

RECOMMENDED CHANGES TO ABOVE: *Add specification for minimum of two available PCI slots.*

BASIC MACHINE PRICE UPGRADES

$85	Upgrade to 1GB MHZ chip
$90	Upgrade RAM to 256MB (maximum of two DIMM's)
$150	Upgrade RAM to 384MB
$235	Upgrade RAM to 512MB from 256MB

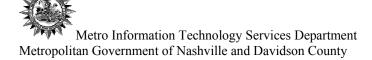| $ 60 | Upgrade VRAM from 4MB to 16MB (NVIDIA TNT2) |
$195	Upgrade VRAM from 16MB to 32MB (Matrox Dual Monitor Capable)
$205	Upgrade monitor from 17" SVGA to 19" SVGA (.28mm pitch or better)
$560	Upgrade monitor from 19" SVGA to 21" SVGA (.28mm pitch or better)
$ 70	Upgrade CD-ROM to 16XDVD-ROM Drive
$135	Add 4/8/32x (or better) CD-RW Drive (in addition to existing CD-ROM drive)
	Substitute Stereo Headphones for Speakers
$30	Upgrade Hard Drive to 20GB
$70	Upgrade Hard Drive to 40GB
$375	Substitute 17" monitor with 15" LCD TFT Flat Panel Monitor
$690	Substitute 17" monitor with 17" LCD TFT Flat Panel Monitor
$135	Add 250MB Zip Drive
$55	56K Fax/Modem

STANDARD GX270 CONFIGURATION:

Last Updated: 16 January 2004

Metro Revolving Fund Desktop Computer Specifications, December, 2003

Metro Quote #ITS530, Dell Quote #115216868 $1,050 per unit
GX270 Workstation
ITEM *(or better)*
2.6GHZ (or better) P4 Mini-Tower Workstation with 512-KB Write-Thru Cache (or better)
512MB RAM
32MB VRAM
17" Flat glass CRT" with 25 mm DOT Pitch (or better)
1.44 MB 3.5 Inch Floppy Drive
One(1) Serial Port, one (1) high speed EPP Parallel Port, one (1) PS2 Mouse Port, one (1) Keyboard Port, Six (6) USB ports
Minimum of four (4) PCI Slots and one (1) AGP Slot
40GB (or better) EIDE Hard Drive
Integrated Intel Gigabit 10/100/1000 NIC Card
Integrated Audio (Sound Blaster Sound Card) w/satellite speakers
105-Key USB Keyboard
Logitech USB 2-Button Optical Mouse with Mouse Pad
48x (or better) CD-RW Drive
Windows XP Operating System
Three Year Parts and Labor Warranty 24x7 w/ 4 hour Support (On-Site Service)

All upgrades have to been paid for from your departments operating budget if you choose to buy any of the items listed below. Please supply your departments business unit at the time of placing your order with the ITS Deployment Team.
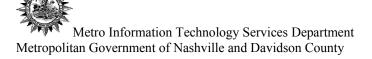
BASIC MACHINE PRICE UPGRADES	
$ 90.00	1GB RAM Upgrade
$ 65.00	64MB VRAM
$ 95.00	Upgrade monitor from 17" SVGA to 19" SVGA (.28mm pitch or better)
$425.00	Upgrade monitor from 19" SVGA to 21" SVGA (.28mm pitch or better)
$ 25.00	Upgrade CD-ROM to 16XDVD-ROM Drive (Requires upgraded video)
$ 55.00	Add 48x (or better) CD-RW Drive (in addition to existing CD-ROM drive)
$ 50.00	48X DVD/CD-RW Combo Drive
$ 20.00	Upgrade Hard Drive to 80MB HD
$ 40.00	Upgrade Hard Drive to 120MB HD
$195.00	Substitute 17" monitor with 15" LCD TFT Flat Panel Monitor
$295.00	Substitute 17" monitor with 17" LCD TFT Flat Panel Monitor
$395.00	Substitute 17" monitor with 18" LCD TFT Flat Panel Monitor
$495.00	Substitute 17" monitor with 19" LCD TFT Flat Panel Monitor
$ 25.00	56K Internal Fax/Modem
$ 0	Substitute Stereo Headphones for Speakers

SX270 CONFIGURATION:

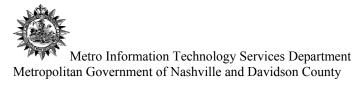**Dell OptiPlex SX270 Ultra Small Form Factor**
Last Updated: 18 Jan 04

Price: 1,415.00

Date:	Sunday, January 18, 2004 11:28:12 PM CST
Catalog Number:	84 Retail RC964294
OptiPlex SX270 Ultra Small Form Factor:	Intel® Pentium® 4 Processor 2.60GHz, 800FSB, 512K Cache 26S8U - [221-7205]
Memory:	512MB DDR Non-ECC SDRAM 333MHz (2 DIMMs) 512N32 - [311-2864
Keyboard:	Performance USB Keyboard with 8 Hot Keys USB8 - [310-2585]
Monitor:	Dell UltraSharp™1504FPa flat panel(15.0viewable),Height Adjustable Stand 1504FPA - [320-2955]
Embedded Video Board:	Integrated Intel® Extreme Graphics INT - [320-0557]
Internal Boot Hard Drive:	20GB EIDE, 9.5 MM, 5400 RPM 20 - [340-7332]
Floppy:	1.44MB 3.5 Inch Floppy Drive 3 - [340-7335]
Operating System:	Microsoft® Windows® XP Professional, SP1, with Media and NTFS XPP1EC - [420-2119]
Mouse:	Dell USB 2-Button Optical Mouse with Scroll USBO - [310-4126]
Network Adapter (NIC):	Integrated Intel Gigabit (10/100/1000), with Alert Standards Format INT - [430-0410]
Module Bay Devices:	24X Max, Slimline DVD-CDRW Combo Drive with Software Decode 24COMBO - [313-2125]
Audio Solutions:	Integrated Sound Blaster Compatible INT - [313-8170]
Speakers:	DELL A215 SPEAKERS A215 - [313-2316]
Video Adapter Cable:	DVI-to-VGA Video Adapter Cable DVI - [310-3972]
Hardware Support Services:	Promo 3Yr Ltd Warranty 3Yr Same Day 4Hr On-Site Service (M-F 8am-6pm) 99U4HR - [950-6610 950-6612]

Installation Support Services:	No Installation NOINSTL - [900-9987]
Mouse Pad:	SLG Mouse Pad 75820 - [367-0626]
Services- Asset Tag on System Chassis (CFI):	Standard Medium Mylar Tag w/ "Bill To" Customer Name (Public, CBG, PAD) TAG5 - [365-1390]

LAPTOP CONFIGURATIONS AVAILABLE:

Dell Latitude D600:
Lasted Updated: 18 Jan 04

==Price: $1,880.00==

Date:	Sunday, January 18, 2004 11:49:10 PM CST
Catalog Number:	84 Retail RC964294
Latitude D600:	Pentium® M Processor 1.40GHz with 14.1in XGA Display D614X - [221-2640]
Memory:	512MB,1 DIMM,DDR SDRAM 512MB - [311-1875]
Keyboard:	PERFORMANCE USB KYBD USB - [310-2850]
External Monitors:	17 Dell M782, 16 inch VIS in Grey GM782 - [320-0591]
Hard Drive:	20GB,HD,9.5MM,4200RPM 20D - [340-6894]
Floppy Drive Options:	Floppy Drive FD - [340-6895]
Operating System:	Microsoft® Windows® XP Professional, SP1, with media XPPRO1 - [420-1946]
Mouse:	DELL LOGITECH USB OPTICAL MOUSE DUSB - [310-8574]
Modem:	Internal 56K Modem I56 - [313-1535]
AC Adapter:	65W AC Adapter 65AC - [310-4225]
Module Bay Devices:	8-24-24-24X SWDVD/CDRW Combo Drive 24XCMBO - [313-2115]
Wireless Local Area Networking Options:	No Wireless LAN Card NW - [430-0484]
Batteries:	6 CELL PRIMARY BATTERY 6C - [312-0054]
Carrying Case:	CLASSIC NYLON CARRYING CASE NC - [310-2852]
Hardware Support Services:	3 Year Limited Warranty plus 3 Year NBD On-site Service and CompleteCare U3(- [900-6232 900-6600 960-0407]
File System:	NTFS File System for all Operating Systems NTFS - [420-3699]
Mouse Pad:	SLG Mouse Pad 75829 - [367-0626]
Services- Asset Tag on System Chassis (CFI):	Standard Medium Mylar Tag w/ "Bill To" Customer Name (Public, CBG, PAD) TAG5 - [365-1390]

Dell Latitude D800 Laptop
Last Updated: 16 January 2004

Metro Revolving Fund Laptop Computer Specifications, December, 2003

Metro Quote #ITS531, Dell Quote #115602084 -$2,025.00 per unit	
D-800 Latitude Laptop	
ITEM *(or better)*	
1.4GHZ (or better) Pentium M Processor w/15" TFT LCD Screen	
512MB Memory	
32MB VRAM	
20GB (or better) EIDE Hard Drive	
10/100 NIC/Modem Integrated Combo Card	
48X CD-RW/DVD Drive	
1.44MB Floppy Drive	
Windows XP Operating System	
Upgraded Nylon Carrying Case	
Primary Battery included (Smart Lithium-Ion)	
17" Flat glass CRT" with 25 mm DOT Pitch (or better)	
Grey 105-Key USB Keyboard	
Logitech USB 2-Button Optical Mouse in Grey	
Integrated Audio with External Speakers	
90 Watt AC Adapter	
Three Year Next Business Day Parts and Labor Warranty including Accidental Damage	

All upgrades have to been paid for from your departments operating budget if you choose to buy any of the items listed below. Please supply your departments business unit at the time of placing your order with the ITS Deployment Team.

$275.00	**D/Dock Docking Station**
$115.00	**D/Dock Port Replicator**
$ 40.00	**D/Monitor Stand for Docking Station or Replicator**
$ 60.00	**D/View Notebook Stand for Replicator only**
$425.00	**1GB RAM Upgrade**
$ 30.00	**30GB Hard Drive**
$ 65.00	**32MB VRAM Upgrade to 64MB VRAM**
$300.00	**2X DVD+RW Drive**
$ 70.00	**9 Cell/72 Hour Spare Primary Battery**
$ 45.00	**Leather Carrying Case**
$ 95.00	**Grey M992 19" Monitor**
$425.00	**Grey P1130 21" Monitor**
$195.00	**15" Flat Panel LCD Monitor**
$295.00	**17" Flat Panel LCD Monitor**
$395.00	**18" Flat Panel LCD Monitor**
$495.00	**19" Flat Panel LCD Monitor**

Dell Latitude X300
Last Updated: 18 Jan 04

Price: $2,325.00

Date:	Sunday, January 18, 2004 11:41:27 PM CST

Catalog Number:	84 Retail RC964294
Latitude X300:	Latitude X300 Pentium M Processor 1.2GHz with 12.1 XGA Display 12X - [221-3042]
Additional Memory:	512MB,1 DIMM, DDR TOTAL 640MB 512M - [311-2940]
Keyboard:	Performance USB Keyboard USB - [310-2850]
External Monitors:	17 Dell M782, 16 inch VIS in Grey GM782 - [320-0591]
Hard Drive:	20GB,HD,9.5MM,4200RPM 20G - [340-8873]
Floppy Drive:	Floppy Drive, Internal/External FD - [340-6895]
Operating System:	Microsoft® Windows® XP Professional, SP1, with media XPPRO1 - [420-1946]
Mouse:	Dell USB Mouse GUSB2BO - [310-8574]
Modem:	Internal 56K Modem I56 - [313-1883]
AC Adapter:	65W AC Adapter 65AC - [310-4225]
Media Base and External Optical Drives:	MEDIABASE W/24X CDRW/DVD MBCMBO - [313-2118]
Wireless Local Area Networking Options:	No wireless LAN card NW - [430-0484]
Batteries:	65WHr EXTENDED LIFE EXTRA BATTERY 8C - [312-0117]
Carrying Case:	Slipcover carrying case LSC - [310-3980]
Hardware Support Services:	3 Year Limited Warranty plus 3 Year NBD On-site Service and CompleteCare U3C - [900-6600 960-0407 900-6232]
Installation:	No Installation NOINSTL - [900-9987]
File Systems:	NTFS File System for all Operating Systems NTFS - [420-3699]
Removable Storage:	64MB USB FLASH STORAGE DEVICE 64MKEY - [310-2877]
Services- Asset Tag on System Chassis (CFI):	Standard Medium Mylar Tag w/ "Bill To" Customer Name (Public, CBG, PAD) TAG5 - [365-1390]
Additional Options:	Mouse Pad 74738 - [367-0626]

Dell Precision 360 Workstation
Last Updated: 09 Jun 04
Price: $2074.00

Catalog Number	84 Retail RC964294
Dell Precision Workstation 360 Desktop	Intel® Pentium® 4 Processor 2.80GHz, 1MB / 800MHz FSB 3D281 - [221-4071]
Operating System	Microsoft® Windows® XP Professional, SP1 with Media and NTFS WXP1 - [420-1931]
Memory	1GB,DDR333 SDRAM Memory,NECC (2 DIMMS) 1GN23 - [311-2782]
Boot Hard Drive	40GB ATA-100 IDE, 1 inch (7200 rpm) 40I72 - [340-9263]
Monitor	Dell UltraSharp™1703FP flat panel(17.0 vewable), HeightAdjustableStand 1703FPH - [320-5698]
Graphics Card	nVidia, QuadroFX 500, 128MB, dual monitor VGA or DVI/VGA capable QFX500 - [320-0693]
Speakers	Dell Two Piece Stereo System A215 - [313-2316]
CD-ROM, DVD and Read-Write Devices	48X/32X/48X CDRW with Roxio® Easy CD Creator CDRW - [313-1922]
Floppy Drive	3.5 inch 1.44MB Floppy Drive 3 - [340-7634]
Systems Management	Dell OpenManage Client Instrumentation OMCI70 - [420-3904]
Keyboard	Enhanced Performance, USB (8 Hot Keys) U8 - [310-2701]
Mouse	Dell USB 2-Button Optical Mouse with Scroll LOD - [310-4165]
Mouse Pad	Mouse Pad MPAD - [310-0007]

APPENDIX A

GartnerGroup Metro IT Strategic Plan

Steering Committee and Project Team Members

STEERING COMMITTEE

Reviews and provides approval and guidance on materials presented to it at regular intervals during the study from Gartner and the project team. Members, listed below, are charged with representing all of Metro, particularly those not represented on the committee.

Richard McKinney	ISD	Chairman
David Manning	Finance	
David Howell	Police	
Teri Sullivan	JIS	
Donna Nicely	Library	
Karl Dean	Legal	
Jim Brent	Water	
Bill Garrett	Register of Deeds	
John Dietz	Metro Schools	
Joan Sheffer	Sheriff	

PROJECT TEAM

Gathers, organizes and interprets the information, using the tools and interpretative expertise/guidance provided by Gartner. Members, listed below, are assigned to be liaisons to specific other departments/entities not already represented on the team, and are charged with managing the collection of data from those departments.

Doug Eckert	ISD	Project Team manager
John Singleton	Police	
Nikki Meyer	JIS	
Walter Jarrell	ISD	
Dan Pursley	Finance	
Jeff Lawrence	Planning	
Bob Storey	Sheriff	
Chuck Holmes	Health	
Brenda Wynn	Mayor's Office	
George Rooker	Assessor of Property	

APPENDIX B

GartnerGroup Metro IT Strategic Plan

Participating Departments Listing

Department
Sports Authority
ADA Office
Agricultural Extension
Arts Commission
Assessor
Beer Board
Benefit Board
Bordeaux Hospital
Codes
Communications Center (911 Board)
Convention Center
Council Staff Office
County Clerk
Economic Development
Election Commission
Fairgrounds (incl. Flea Market)
Farmer's Market
Finance
Fire (includes EMS)
General Hospital
General Services
Health
Historical Commission
Human Relations Commission
Human Resources (incl. Civil Service Comm.)
ISD
JIS
Juvenile Court
Legal
Library
Mayor's Office
Metro Action Commission (MAC)
Metro Clerk

Metro Transit Authority
Municipal Auditorium
Nashville Career Advancement Ctr (NCAC)
Office of Emergency Management (OEM)
Parks
Planning
Police
Public Works
Register of Deeds
Sheriff
Social Services
Soil and Water Conservation
Taxi & Wrecker License Board
Trustee
Water Services